

**STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGULAR MEETING OF DECEMBER 8-9, 2022

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ITEM NUMBER: 9

SUBJECT: Update on Per- and Polyfluoroalkyl Substances (PFAS) in the Central Coast Region

STAFF CONTACTS: Greg Bishop, Site Cleanup Program
(805) 549-3132, greg.bishop@waterboards.ca.gov

Ryan Lodge, Landfill Program
805-549-3506, ryan.lodge@waterboards.ca.gov

Sheila Soderberg, Department of Defense Program
805-549-3592, sheila.soderberg@waterboards.ca.gov

Jennifer Epp, Waste Discharge Requirements Program
805-594-6181, jennifer.epp@waterboards.ca.gov

Leah Lemoine, Natl. Pollutant Discharge Elimination System Program, 805-549-3159, leah.lemoine@waterboards.ca.gov

KEY INFORMATION

Uses: PFAS are used to make commercial and industrial products that resist heat, water, and oil.

Chemistry: PFAS are fluorinated organic chemicals that are resistant to degradation and persistent in the environment.

Human Health: PFAS exposure can lead to adverse human health effects, including effects to the immune system, cancer, thyroid hormone disruption, high blood pressure, and kidney disease, as well as effects on infant birth weights.

Investigations: Airports with fire training and fire response facilities, landfills that accepted municipal waste, wastewater treatment plants, refineries and bulk fuel facilities, and metal plating shops are currently being investigated. Monitoring for PFAS in public water supply wells has also been required in areas of known or suspected PFAS contamination.

ACTION: Informational Item

SUMMARY

This is an informational item to provide a general update on activities related to per- and polyfluoroalkyl substances (PFAS) conducted by the State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Boards), collectively known as the Water Boards. Per- and polyfluoroalkyl substances (PFAS) are a group of human-made chemicals that include perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).

PFAS have been manufactured since the 1940s and are used in many industrial applications and consumer products because they are resistant to heat, water, and oil. PFAS are resistant to degradation and persistent in the environment, have long half-lives, and can accumulate in the human body and in food chains. Because of their ubiquitous use and improper disposal, spills, and other releases, PFAS have been introduced into the environment and are present in some food and drinking water sources. There is evidence that PFAS exposure can lead to adverse health outcomes in humans.

The Water Boards are conducting statewide PFAS groundwater investigations using a phased approach. In July 2018, the Water Boards initiated PFAS investigations with the issuance of a drinking water notification level for perfluorooctane carboxylate (PFOA) and perfluorooctane sulfonate (PFOS), the two most studied PFAS chemicals. Since that time, the Water Boards have issued orders to require monitoring of PFAS chemicals in likely source areas, including commercial airports with fire training and response facilities, landfills that accepted PFAS-containing municipal waste, wastewater treatment plants, refineries and bulk fuel facilities, and hexavalent chromium plating facilities. The State Water Board also issued monitoring orders to public water systems with wells located adjacent to airports and landfills and expanded monitoring to include public water supply wells located near military facilities. On October 31, 2022, the State Water Board issued drinking water notification and response levels for perfluorohexane sulfonic acid (PFHxS). This information is crucial to further our understanding of the impact of PFAS to human health and groundwater quality.

This informational item will include presentations by staff from the State Water Board Division of Water Quality (DWQ) and Division of Drinking Water (DDW) to provide a statewide perspective, as well as Central Coast Water Board staff to discuss regional findings. For more detailed information on PFAS and related activities at the Water Board, please visit the [State Water Board's PFAS webpage](https://www.waterboards.ca.gov/pfas/)¹.

BACKGROUND

PFAS are a group of anthropogenic (i.e., human made) chemicals that are resistant to heat, water, and oil. PFAS manufacturing started in the 1940s and there are an estimated 9,000 PFAS in production. PFAS containing products include carpets, rugs, water-proof clothing and stain repellants, upholstery, food paper wrappings and

¹ <https://www.waterboards.ca.gov/pfas/>

containers, metal plating (e.g., cookware), non-stick products, cleaning products, fire-fighting foams (e.g., aqueous film-forming foam [AFFF]), and spray-on car “waxes”. PFAS do not occur naturally. Under a PFOA Stewardship Program with the U.S. Environmental Protection Agency (USEPA), eight major PFAS producers have phased out PFOA and other PFAS substances from emissions and products. However, manufacturers are developing replacement technologies in the PFAS family by substituting longer-chain substances with shorter-chain substances.

California now has several laws to address the use of PFAS. For example, in October 2021, Governor Newsom adopted Assembly Bill 1200 that bans the use of PFAS in paper, paperboard, and other plant-fiber based food packaging, beginning January 1, 2023. Most recently, in September 2022, Governor Newsom signed AB 1817 into law prohibiting the manufacture, distribution, or sale within California of any new textile articles or cosmetics containing regulated PFAS beginning January 1, 2025. Certain textiles are excluded from the ban, such as “outdoor apparel for severe wet weather conditions,” including personal protective equipment for firefighters.

Chemistry, Transport and Fate of PFAS

PFOA and PFOS are fluorinated organic chemicals that are part of the PFAS group of chemicals. There are an estimated 9,000 individual PFAS in existence. Their carbon-fluoride bond is one of the strongest bonds in chemistry, making PFAS resistant to degradation and highly persistent in the environment. PFOS has low volatility and PFOA is relatively volatile. The solubility of PFAS is generally higher than other organic compounds and is affected by factors such as salt content, pH, and redox conditions. As long-chain PFAS are being phased out of use in the U.S., they are being replaced by short-chain PFAS compounds that are more mobile in water. In addition, long-chain PFAS, such as PFOA and PFOS, found in the environment are likely to break down to shorter-chain PFAS chemicals. The fate, transport, and chemical transformation characteristics of PFAS chemicals are largely unknown and are areas of active scientific research. However, it is known that fate and transport properties can vary considerably for individual PFAS compounds.

Soil and Sediment

PFAS are found in soil and sediments due to atmospheric deposition, exposure to PFAS materials (e.g., landfill leachate or biosolids), and direct discharges. Soil and sediments can act as a secondary source of PFAS to groundwater and surface water through percolation and leaching processes. Site-specific soil conditions, such as total organic carbon and soil particle electromagnetic charges, and properties of individual PFAS are important factors affecting PFAS movement through soil and sediments.

Groundwater

PFAS dissolve into groundwater readily and are generally mobile, with surfactant like properties. Due to the mobility of PFAS in groundwater and their persistence in the environment, PFAS can exhibit larger plumes than other contaminants in the same hydrogeologic setting.

Human Health Effects and Exposure Routes

In 1999, the Centers for Disease Control (CDC) found PFAS in the blood serum of nearly all people tested, indicating widespread PFAS exposure to the U.S. population. According to the CDC, blood levels of both PFOA and PFOS steadily declined in U.S. residents from 1999 to 2014 by 60 to 80%, respectively, due to a reduction in PFAS production and use of some PFAS.

USEPA reports that there is evidence that PFAS exposure can lead to adverse health outcomes in humans. If humans, fish, or other animals ingest food or drinking water containing PFAS, the PFAS get absorbed and can accumulate in their bodies. Additionally, PFAS stay in the human body for long periods and PFAS exposure over time can increase PFAS levels resulting in adverse health effects. PFAS can cause reproductive and developmental, liver and kidney, and immunological effects in animals. PFOA and PFOS have both caused tumors in animal studies. Increased cholesterol levels are the most consistent finding from human epidemiology studies, with more limited findings related to effects on infant birth weights, the immune system, cancer (for PFOA), and thyroid hormone disruption (for PFOS).

PFAS Exposure in Food and Drinking Water

The primary exposure pathway for people is through ingestion of food or drinking water containing PFAS. Food can be contaminated with PFAS from contaminated soil and water used to grow food, food packaging containing PFAS, and food processing equipment and cooking utensils containing PFAS. Living organisms, including fish and animals, can accumulate PFAS over time and consumption of organisms that bioaccumulate PFAS is another ingestion pathway for people.

PFAS Exposure in Consumer and Commercially Treated Products

Normal use or disposal of consumer products that contain PFAS can result in human exposure to PFAS. Many products are commercially treated to make them stain- and water-repellent or nonstick. Examples include carpet, leather and apparel, textiles, paper and packaging materials, and non-stick cookware. People employed at PFAS production facilities or at facilities that manufacture goods made from PFAS can also be exposed in occupational settings through inhalation of contaminated air.

DISCUSSION

Regulatory Status of PFAS in Drinking Water

On June 15, 2022, USEPA issued interim updated drinking water health advisories for PFOS and PFOA, advising municipalities that they should notify their customers of the presence of PFAS levels over 70 ng/L in community water supplies. The updated advisory levels, which are based on new science and consider lifetime exposure, indicate that some negative health effects may occur at very low concentrations of PFOA or PFOS in drinking water. The health advisory is non-enforceable and provides guidance to states and offers a margin of protection for the public from adverse health effects from PFAS exposure in drinking water. The USEPA recommended that

notifications include information on the increased risk to health, especially for susceptible populations. In August 2022, USEPA proposed designating PFOA and PFOS as hazardous substances under CERCLA (aka Superfund).

Despite USEPA's PFOS and PFOA health advisory, currently, there are no public health goals (PHGs) or drinking water standards (maximum contaminant level [MCLs]) for PFAS. The California Health and Safety Code authorizes the State Water Board to issue notification and response levels for contaminants in drinking water delivered for human consumption before an MCL has been adopted. On October 31, 2022, the State Water Board issued a [drinking water notification](#)² level and response level of 3 ng/L and 20 ng/L, respectively for perfluorohexane sulfonic acid (PFHxS).

PFAS Notification Levels

Notification levels are nonregulatory, health-based advisory levels for contaminants that are established as precautionary measures. Additionally, notification levels are also based upon the levels at which chemicals can be reliably detected. There is no requirement that a public water system stop serving water to its customers if a notification level is exceeded

Notification levels exist for four distinct PFAS (PFOA, PFOS, perfluororobutane sulfonic acid (PFBS), and perfluorohexane sulfonic acid (PFHxS)):

PFOA:	5.1 ng/L
PFOS:	6.5 ng/L
PFBS:	0.5 µg/L
PFHxS:	3 ng/L

PFAS Response Levels

Response levels are established in conjunction with notification levels and represent the concentration of a drinking water contaminant at which additional steps, beyond notification, are recommended to reduce public exposure. Additional steps may include taking the contaminated drinking water source out of service, blending, or treatment to reduce PFAS concentrations to less than the response levels. Response levels exist for the same four PFAS:

PFOA:	10 ng/L
PFOS:	40 ng/L
PFBS:	5 µg/L
PFHxS:	20 ng/L

² https://www.waterboards.ca.gov/drinking_water/programs/documents/PFHxS-issuance.pdf

PFAS Investigations in the Central Coast Region

As part of the initial phase of investigations, in March 2019, the State Water Board issued orders to landfills and commercial airports known to use AAAF requiring investigations for PFAS in groundwater. In the Central Coast region, twelve landfill operators and four airport operators received orders to conduct PFAS investigations. All of the targeted facilities have complied with the investigative orders. Additionally, in April 2019 and October 2022, the State Water Board also issued investigative orders to public water systems in the vicinity of these airports and landfills.

Following the initial phase of investigations at airports and landfills, in October 2019, the State Water Board issued investigative orders to chrome plating facilities, and in July 2020, the State Water Board issued investigative orders to wastewater treatment plants. In February 2021, the State Water Board issued investigative orders to public water systems within and adjacent to Department of Defense (DoD) facilities in California. In March 2021, the State Water Board also issued investigative orders to refineries and bulk-fuel facilities. These PFAS investigations are described in greater detail below.

Landfill Investigations

In 2019, the State Water Board issued Water Code section 13267 orders for the Determination of the Presence of Per- and Polyfluoroalkyl Substances (PFAS), [Order WQ 2019-0006-DWQ](#)³ to active landfills to sample leachate and groundwater for 23 PFAS analytes. The following twelve (12) active landfills in the Central Coast region submitted sampling workplans and subsequently submitted data to satisfy the sampling requirements in the order:

- Buena Vista Landfill
- Chicago Grade Landfill
- Cold Canyon Landfill
- John Smith Road Landfill
- Johnson Canyon Landfill
- Lompoc Solid Waste Site
- Monterey Peninsula Landfill
- Paso Robles Landfill
- Santa Cruz Landfill
- Santa Maria Landfill
- Tajiguas Landfill
- Watsonville Landfill

Data from the sampling events indicated that all landfill leachate sampled contained PFAS. Results from initial monitoring showed that the highest landfill leachate analytes were perfluorohexonic acid (PFHxA), perfluorovaleric acid (PFPeA), PFOA, perfluorobutanoic acid (PFBA), and perfluoroheptanoic acid (PFHpA) with concentrations up to 5,800 ng/L, 5,800 ng/L, 5,700 ng/L, 4,200 ng/L, and 1,900 ng/L,

³ https://www.waterboards.ca.gov/pfas/docs/landfill_pfas_13267_go_03202019.pdf

respectively. Similar to landfill leachate, PFAS detections in groundwater had the highest concentrations for PFHxA, PFPeA, PFOA, PFBA, and PFHpA with concentrations up to 1,900 ng/L, 1,200 ng/L, 1,400 ng/L, 610 ng/L, and 710 ng/L, respectively. Other PFAS analytes of interest that have established notification levels or proposed notification levels include PFBS, PFHxS, and PFOS with leachate concentrations up to 2,100 ng/L, 1,700 ng/L, and 480 ng/L, respectively, and groundwater detections up to 170 ng/L, 210 ng/L, and 240 ng/L, respectively.

Based on the initial PFAS sampling data, the Central Coast Water Board issued a California Water Code (CWC) section 13267 investigation order in July 2021, requiring active landfill operators to submit a follow-up PFAS workplan. The follow-up workplan required landfill operators to 1) include a minimum of semi-annual PFAS monitoring for two years for 31 PFAS analytes, 2) identify potential sources of PFAS, 3) provide a leachate management plan, and 4) provide a plan to identify potential downgradient receptors, including notification of neighboring property owners if data indicate PFAS impact or threaten to impact supply well(s). Active landfills submitted follow-up PFAS workplans, and the workplans have been reviewed and approved by Central Coast Water Board staff. Data from the follow-up workplans will help inform next steps in minimizing PFAS water quality impacts from landfills in the Central Coast region.

Commercial Airport Investigations

In 2019, the State Water Board also issued CWC section 13267 orders for the Determination of the Presence of Per- and Polyfluoroalkyl Substances (PFAS), [Order WQ 2019-0005-DWQ](#)⁴ to airports, including the following four (4) airports in the Central Coast region:

- Monterey Regional Airport
- San Luis Obispo County Regional Airport
- Santa Barbara Municipal Airport
- Santa Maria Public Airport

Investigations have been performed and PFAS was detected at all four airports. Currently, all four airports are in various stages of further investigation. The Central Coast Water Board's Site Cleanup Program (SCP) has identified the San Luis Obispo County Regional Airport and Santa Barbara Airport investigations as a high priority due to PFAS detections in nearby drinking water supply wells.

At the San Luis Obispo County Regional Airport, maximum concentrations of select PFAS in groundwater were: 130,000 ng/L PFOS; 50,000 ng/L PFOA; and 790,000 ng/L PFHxS. In drinking water supply wells located offsite, PFAS are detected as high as 910 ng/L PFOS; 100 ng/L PFOA; and 1,300 ng/L PFHxS. Additionally, at the Santa Barbara Airport, soil excavations were performed following the application of AFFF during a 2019 C-130 plane crash incident.

⁴https://www.waterboards.ca.gov/pfas/docs/airport_pfas_13267_go_03202019.pdf

Public Water System Investigations – Drinking Water Well Sampling

In April 2019, the State Water Board issued investigative orders to public water systems to require PFAS sampling in drinking water wells in the vicinity of airports and landfills. In October 2022, the State Water Board updated these requirements by issuing [General Order DW-2022-0001-DDW](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/docs/pfas_go_2022-0001-DDW.pdf)⁵ for specific public water systems to sample and report PFAS. This order covered 1,296 public supply wells in 386 public water systems. [Exhibit A](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/docs/pfas_go_2022-0001-DDW_ExhibitA.pdf)⁶ to the order provides the List of Sources Subject to General Order No. DW 2022-0001-DDW, including approximately ninety-seven (97) public supply wells in the Central Coast region. Interactive maps with analytical results and the full dataset for this sampling event are available online: <https://www.waterboards.ca.gov/pfas>. (Click on the “PFAS Mapping Tool.”)

As described above, the most significant PFAS impacts to drinking water supply wells in the Central Coast region have been detected around the San Luis Obispo County Regional Airport in the area south and west of the airport and in an industrial area south of Tank Farm Road. A drinking water supply well near the Santa Barbara Airport also has PFAS detections. The Central Coast Water Board’s SCP has prioritized these areas for further investigation.

Wastewater Treatment Facility Investigations

Domestic and commercial wastewater flows to publicly owned treatment works (POTWs) contain per- and polyfluoroalkyl substances (PFAS). Conventional POTWS are not designed to treat for PFAS and have the potential to discharge these wastes to the environment. Potential discharges include, but are not limited to, wastewater effluent disposal to surface water and groundwater via percolation, the application of biosolids or compost containing biosolids to land, irrigation with recycled water, and the disposal of reverse osmosis concentrate/retentate from advanced treatment facilities. In July 2020, the State Water Board issued [Order WQ 2020-0015-DWQ](https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2020/wqo2020_0015_d_wq.pdf)⁷ which required owners and operators of POTWs that have a design capacity at or exceeding one million gallons per day (mgd) to conduct sampling and analysis for PFAS. In the Central Coast region, twenty-nine (29) POTWs received the order and complied with the requirements to conduct PFAS sampling and analysis.

The technical sampling and reporting requirements associated with the order focused on PFOS and PFOA and included requirements to sample influent, effluent, biosolids, and when applicable, reverse osmosis concentrate/retentate. The order additionally required groundwater monitoring for PFAS for POTWs with existing groundwater monitoring and reporting programs.

⁵https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/docs/pfas_go_2022-0001-DDW.pdf

⁶https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/docs/pfas_go_2022-0001-DDW_ExhibitA.pdf

⁷https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2020/wqo2020_0015_d_wq.pdf

The range of concentrations at POTWs in the Central Coast region for PFOA and PFOS in influent or effluent wastewater are similar in magnitude, with a slightly higher PFOA maximum concentration in effluent wastewater (Table 1). The range of groundwater concentrations are like those in wastewater with a slightly higher maximum concentration for PFOS. Median concentrations for PFOA, PFOS, and PFAS sums for the Central Coast POTWs are also similar in magnitude compared to their state-wide median concentrations (Table 2).

Table 1: Ranges of PFOA, PFOS, and PFAS Sums Observed in Central Coast POTWs⁸

Chemical	Influent (ng/L)	Effluent (ng/L)	Groundwater (ng/L)
PFOA	0.8 – 31	0.8 – 152	6 – 79
PFOS	0.5 – 39	1 – 39	12 – 120
PFAS Sums	24 – 2,777	37 – 1,602	80 – 638

Table 2: Medians of PFOA, PFOS, and PFAS Observed in Central Coast and Statewide POTWs

Chemical	Influent ⁹ – Statewide Median (ng/L)	Effluent ¹⁰ – Statewide Median (ng/L)	Influent ¹¹ – Central Coast median (ng/L)	Effluent ³ – Central Coast Median (ng/L)
PFOA	8	11	5.4	11
PFOS	5	5	5	4.4
PFAS Sums	232	204	322	177

Department of Defense Site Investigations

The USEPA is the lead regulatory agency at all California Department of Defense (DoD) facilities on the National Priorities List (i.e., Superfund Sites) with support from the Regional Boards and the Department of Toxic Substances Control (DTSC). Former Fort

⁸ Data downloaded in February 2022. Drinking Water: NL = Notification Level; RL = Response Level; PFOA: = NL = 5.1 ng/L, RL = 10 ng/L, PFOS: NL = 6.5 ng/L, RL = 40 ng/L

⁹ Number of Samples = 774

¹⁰ Number of Samples = 878

¹¹ Number of Samples = 4

Ord Army base is the only DoD Superfund Site in the Central Coast region. Other DoD installations with ongoing cleanup activities with Central Coast Water Board oversight include Vandenberg Space Force Base, Army Garrison Fort Hunter Liggett, California Army National Guard Camp Roberts, and former Lompoc Army US Disciplinary Barracks.

The DoD has sampled all on-installation owned or operated drinking water wells that provide water to public systems for PFOS and PFOA. If PFOS and/or PFOA concentrations are above USEPA Health Advisory levels, the DoD's policy is to notify users and implement interim actions such as supplying alternative drinking water or using a different source water.

PFOS and PFOA were not detected in DoD public water systems providing drinking water to Vandenberg Space Force Base (VSFB), former Fort Ord, Camp Roberts, or Camp San Luis Obispo. In 2015, PFOS was detected in Fort Hunter Liggett Supply Well #236, located in the cantonment area of the base near Mission San Antonio, reportedly at 330 ng/L. The Army subsequently shut down the well and is relying on other water supply wells located in another portion of the base to provide drinking water for the military installation.

There are a variety of PFAS-containing materials used in relation to current and historical DoD operations. However, the use, storage, and/or disposal of AFFF is the most prevalent potential source of PFAS chemicals at DoD facilities. As such, the DoD has focused its efforts on locating where AFFF was used, stored, and disposed of at DoD facilities. All remaining sites with potential PFAS-containing materials and impacts will be evaluated.

Vandenberg Space Force Base, Santa Barbara County

In 2015, the Air Force performed a base-wide preliminary assessment at VSFB to identify areas of potential PFOS and PFOA releases specifically from AFFF use and storage. From 2018 to 2019, the Air Force performed a site inspection to sample and test for PFOS and PFOA at five VSFB release locations including FT021 (former Fire Training Area 21), 1992 Fuel Spill, 2006 Fuel Spill, 2009 AFFF Release Area, and the Spray Nozzle Test Area.

PFOS was detected in groundwater at only at 2 of the 5 release locations, up to a maximum concentration of 150,000 ng/L. PFOA was detected in groundwater at all five locations, up to a maximum of 8,200 ng/L. Although detected at VSFB, the PFOS and PFOA in groundwater do not pose a significant risk to Air Force personnel or the public, due to current land uses at these locations, large distances to potential receptors, and groundwater flow direction. The Air Force intends to perform additional investigations in 2023/2024.

Former U.S. Army Fort Ord, Monterey County

The USEPA declared Fort Ord a federal Superfund site in February 1990 based on chlorinated solvent impacts to the City of Marina's municipal water supply from facility-

related wastes. The Army performed groundwater investigations at Operable Unit 1 (OU1) for PFOS and PFOA in 2015. In OU1, a former fire drill area adjacent to the airport, where AFFF was historically used, PFOA was detected in groundwater up to 270 ng/L and PFOS was detected up to 72 ng/L.

In 2019, the Army sampled groundwater monitoring wells for PFOA and PFOS at Operable Unit 2 (OU2), a former landfill. PFOA and PFOS were detected in A-Aquifer and Upper 180-Foot Aquifer groundwater monitoring wells, up to 113 ng/L PFOA and 447 ng/L PFOS. A September 2022 Army submittal included recommendations for further investigation at seven potential PFAS source areas: OU1 (Fritzsche Army Airfield [FAAF] Fire Drill Area), OU2, Main Garrison Sewage Treatment Plant, Former Burn Pit, East FAAF Helicopter Defueling Area, FAAF Fire and Rescue Station, and Main Garrison Fire Station.

Most of the groundwater contamination at the former Fort Ord is present in the A-Aquifer and the Upper and Lower 180-Foot aquifers. The water supply for the former Fort Ord community comes from the Marina Coast Water District, which includes the former Fort Ord water supply wells located in the northeastern part of former Fort Ord. Water pumped from these wells is blended with water from other water supply wells within the district's system. In a sample collected in first quarter of 2020, one water supply well had 4.9 ng/L PFHxA and 2.0 ng/L and 2.0 ng/L PFBS.

Local drinking water supplied to communities on and around the former Fort Ord meets all drinking water standards. Marina Coast Water District supply wells and the water served to the community are tested frequently to ensure safe drinking water. The installation of new supply wells is restricted by Monterey County Health Department in areas that may influence the Fort Ord groundwater contamination plumes, as well as in areas with seawater-intruded aquifers.

U.S. Army Garrison Fort Hunter Liggett, Monterey County

In April 2021, the Army identified 13 areas of interest for further site inspection activities at Fort Hunter Liggett based on the potential for current and historical use, storage, and/or disposal of PFAS-containing materials. The Army found PFAS in soil and groundwater samples collected from: Fire Department and Nozzle Testing area, Fire Drill Pit #1, Fire Drill Pit #2, Tusi Heliport, Schoonover Airstrip (including Helicopter Crash Area), Central Fuel Point, Landfill #1, and WWTP Effluent/Spray Area. The highest concentrations in groundwater were found beneath the Fire Department and Nozzle Testing Area up to 5,000 ng/L PFOS and 1,600 ng/L PFOA. The Army expects to begin remedial investigation activities at Fort Hunter Liggett at 3 of the 13 areas of interest in 2023. An additional work plan for remedial investigation at the remaining PFAS areas of interest identified at the installation is also anticipated in 2023.

Cal Guard Camp Roberts, Monterey County

In 2019, the Army identified six areas of interest for site inspection at Camp Roberts, specifically from AFFF use and storage. These areas include East Garrison Old Fire

Station/Army Airfield AFFF Storage area, East Garrison Old Fire Training Area, Main Garrison Fire Training Area 2/former Fire Dept. Fire Station Building 7020, Current Fire Dept. Fire Station/Shipping Container, Fire Dept. Building 3000 Warehouse/Main Garrison Fueling Point, and TUAS Hangar Building 17002 and Naval Postgraduate School Airfield Shed AFFF Storage. In 2021, the Army National Guard (ARNG) and United States Army Corps of Engineers (USACE) performed a site inspection at Camp Roberts. However, the Central Coast Water Board has not received any soil or groundwater PFAS data for Camp Roberts and has not yet received ARNG's draft Site Inspection report presenting the investigation findings and recommendations.

Cal Guard Camp San Luis Obispo, San Luis Obispo County

In 2019, the Army identified five areas of interest for site inspection at Camp San Luis Obispo, specifically from AFFF use and storage. These include Former CAL FIRE Training Area, Former META Yard Fire Training Area, CAL FIRE Cuesta Camp Tenant, O'Sullivan Airfield Shed, and Fuel Point. In 2021, the ARNG and USACE performed a site inspection at Camp San Luis Obispo. However, the Central Coast Water Board has not yet received any soil or groundwater PFAS data for Camp San Luis Obispo and has not yet received the ARNG's draft Site Inspection report presenting the investigation findings and recommendations.

Additional PFAS Investigation and Remediation Activities

The Central Coast Water Board's SCP is also overseeing PFAS investigations at two (2) metal plating shops, and eight (8) refineries and bulk fuel terminals, and at a non-airport fire training facility. Areas of further interest for PFAS investigation include 1) dry cleaners due to their use of protective coatings containing PFAS, 2) car washes due to the use of spray-on water-repellent "waxes", 3) domestic wells in proximity to septic systems due to potential discharges of PFAS through septic leach fields (e.g., from fabric softeners or washing clothes that contain PFAS or have PFAS coatings), and 4) agricultural properties due to spreading of biosolids and/or compost containing PFAS and the presence of PFAS as a declumping agent in pesticides and fertilizers.

Additional data are needed to determine the full extent of PFAS impacts in groundwater in the Central Coast region and associated remediation needs are uncertain. Additionally, PFAS remediation techniques are still being developed. Common remediation approaches such as biodegradation and chemical oxidation are ineffective for PFAS. Groundwater pump-and-treat with activated carbon or resin adsorption and/or reverse osmosis is currently used at some PFAS groundwater remediation sites. Remediation and/or abatement (e.g., replacement water) is anticipated at additional PFAS sites.

Human Right to Water

California Water Code section 106.3, subdivision (a) states that it is the policy of the State of California "that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitation purposes."

On January 26, 2017, the Central Coast Water Board adopted Resolution No. R3-2017-0004, which affirms the realization of the human right to water and the protection of human health as the Central Coast Water Board's top priorities.

Ongoing investigations are defining where PFAS groundwater impacts are present in the Central Coast region, which will allow for informed decisions to promote this policy. Areas where unacceptable levels of PFAS are present in drinking water wells will be identified as a high priority for investigation, cleanup, and potentially replacement water.

Environmental Justice

Environmental Justice principles call for the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income in the development, adoption, implementation, and enforcement of all environmental laws, regulations, and policies that affect every community's natural resources and the places people live, work, play, and learn. The Central Coast Water Board implements regulatory activities and water quality projects in a manner that ensures the fair treatment of all people, including underrepresented communities. Underrepresented communities include but are not limited to Black, Asian, Hispanic/Latino/a/e, California Native American Tribes, Indigenous and other people of color, disadvantaged communities (DACs), severely disadvantaged communities (SDACs), economically distressed areas (EDAs), Tribes, environmentally disadvantaged communities (EnvDACs), and members of fringe communities.¹² Furthermore, the Central Coast Water Board is committed to providing all stakeholders the opportunity to participate in the public process and provide meaningful input to decisions that affect their communities.

PFAS investigations are targeting facilities with the highest likelihood of having PFAS impacts to groundwater, with additional phases planned to extend investigations to other types of facilities. Investigation decisions and remediation solutions to any discovered PFAS impacts are and will continue to be data-driven with priority cleanup efforts applied to areas that have the highest risk to human health. If PFAS pollution to groundwater is discovered in disadvantaged communities, Central Coast Water Board

¹² Disadvantaged Community: a community with an annual median household income that is less than 80% of the statewide annual median household income (Public Resources Code section 80002(e)); Severely Disadvantaged Community: a community with a median household income of less than 60% of the statewide average. (Public Resources Code section 80002(n)); Economically Distressed Area: a municipality with a population of 20,000 persons or less, a rural county, or a reasonably isolated and divisible segment of a larger municipality where the segment of the population is 20,000 persons or less with an annual median household income that is less than 85% of the statewide median household income and with one or more of the following conditions as determined by the department: (1) financial hardship, (2) unemployment rate at least 2% higher than the statewide average, or (3) low population density. (Water Code section 79702(k)); Tribes: federally recognized Indian Tribes and California State Indian Tribes listed on the Native American Heritage Commission's California Tribal Consultation List; EnvDACs: CalEPA designates the top 25 percent scoring census tracts as DACs. Census tracts that score the highest five percent of pollution burden scores but do not have an overall CalEnviroScreen score because of unreliable socioeconomic or health data are also designated as DACs (refer to the CalEnviroScreen 3.0 Mapping Tool or Results Excel Sheet); Fringe Community: communities that do not meet the established DAC, SDAC, and EDA definitions but can show that they score in the top 25 percent of either the Pollution Burden or Population Characteristics score using the CalEnviroScreen 3.0.

staff will engage and assist in directing these communities toward grant and technical assistance opportunities through Proposition 1, SB 445, and other funding opportunities, as appropriate.

Climate Change

The Central Coast faces the threat and the effects of climate change for the foreseeable and distant future. To proactively prepare and respond, the Central Coast Water Board has launched the Central Coast Water Board's Climate Action Initiative, which identifies how the Central Coast Water Board's work relates to climate change and prioritizes actions that improve water supply resiliency through water conservation and wastewater reuse and recycling; mitigate for and adapt to sea level rise and increased flooding; improve energy efficiency; and reduce greenhouse gas production. The Climate Action Initiative is consistent with the Governor's Executive Order B-30-15 and the State Water Board's Climate Change Resolution No. 2017-0012.

Central Coast Water Board staff consider carbon impacts from proposed investigation and remediation projects against the benefits that those proposed projects will provide relative to the carbon impacts. Staff will continue to make decisions during project reviews factoring in climate change effects. Sites that are in areas that are susceptible to flooding or sea level rise would be prioritized relative to other sites. Until additional investigations are performed, the extent of PFAS pollution is determined, and feasible remediation techniques emerge, it is premature to evaluate climate change impacts due to PFAS remediation activities. Water supply limitations due to drought conditions also make it imperative that existing groundwater supplies are protected and cleaned up to the extent practical.

CONCLUSION

The Water Boards will continue to conduct PFAS groundwater investigations using a phased approach. PFAS investigation, analytical, and remediation techniques are still in the early stages of being developed within the environmental industry. The fate and transport of PFAS chemicals in the subsurface is only beginning to be understood. Early indications are that the estimated 9,000 PFAS have substantially different fate and transport characteristics, which is a significant challenge when investigating the extent of PFAS impacts in groundwater and evaluating remediation strategies. Based on investigation results, PFAS are generally found throughout California, including in the Central Coast region, at low to moderate levels except in areas of legacy use of AFFF at airports, refineries, and bulk fuel terminals and landfills where PFAS levels tend to be higher. The Central Coast Water Board is continuing investigations at these industry source areas and will prioritize those cases where drinking water wells are impacted. Addressing PFAS contamination is a complex national, statewide, and regional issue of significance that is going to take a significant coordinated effort and allocation of resources to address over the coming years and decades.